Electronic Train Management Systems

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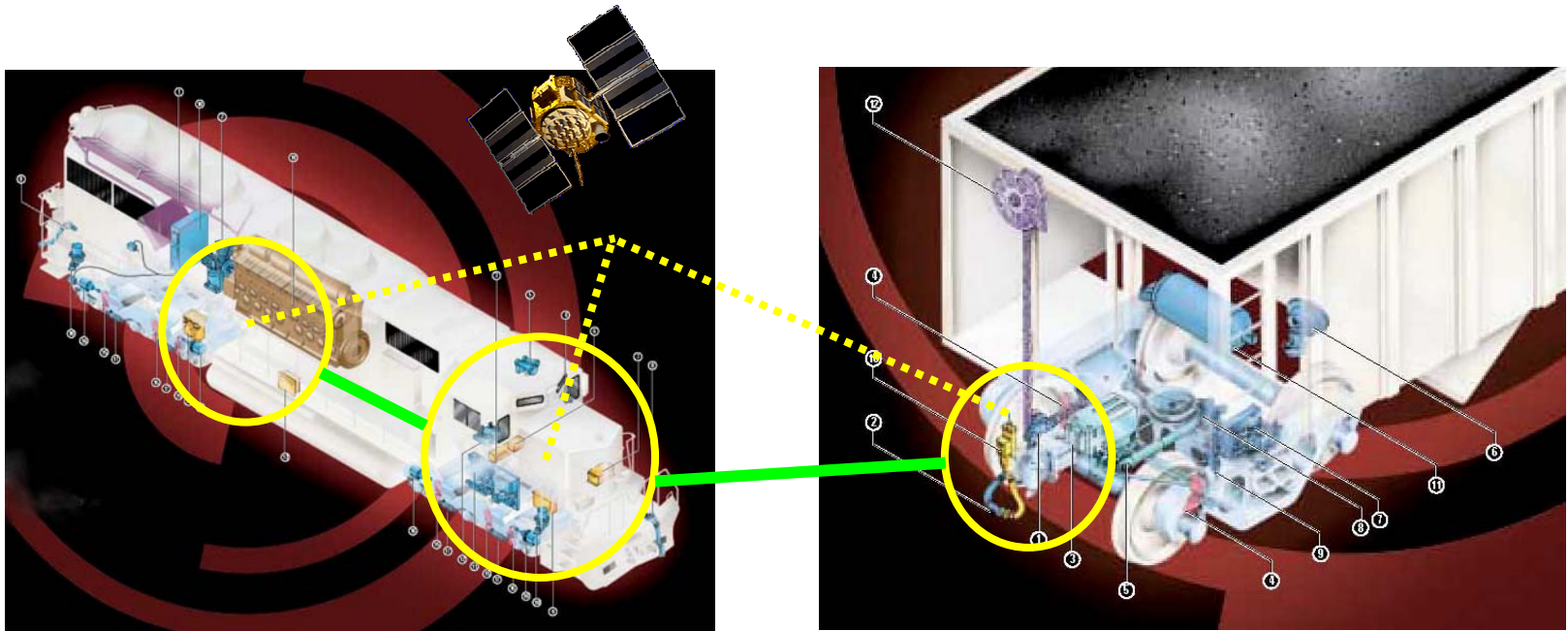
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ETMS™ Concept

- Integrates existing products
    - Allows for future growth via software and incremental hardware
        - Focuses on productivity and asset utilization improvements
        - Provides a platform for future train control

Overlay Systems

- Enforce Compliance to Existing Method of Operation

- Less Costly Implementation

- Most Benefits

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The ETMS Migration Path - ETMS 100

Solution:

ETMS 100* –

Real-time positioning and offboard reporting

Available Features / Benefits:

ENABLES:
Train Location
Fuel Monitoring
Event Recording

Communication Choices:

802.11
MCC
Cellular
VHF / UHF
Satcom

System / Growth:

FuelLink
TrainTrax

Growth through software and incremental hardware

* Office interface required for some features

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The ETMS Migration Path - ETMS 200

Solution:

ETMS 100* –
Real-time positioning and offboard reporting

ETMS 200* –
Adds Human Interface

PLUS:
Alertness Assurance
Crew Performance
TrainLink ES
Train Pacing
Reactive Enforcement
Digital Display of Authority
Work Zone Protection

Available Features / Benefits:

ENABLES:
Train Location
Fuel Monitoring
Event Recording

Communication Choices:

802.11
MCC
Cellular
VHF / UHF
Satcom

802.11
MCC
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System / Growth:

FuelLink
TrainTrax

FuelLink
TrainTrax
TrainLink ES

Growth through software and incremental hardware

* Office interface required for some features

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The ETMS Migration Path - ETMS 300

Solution:

ETMS 100* –
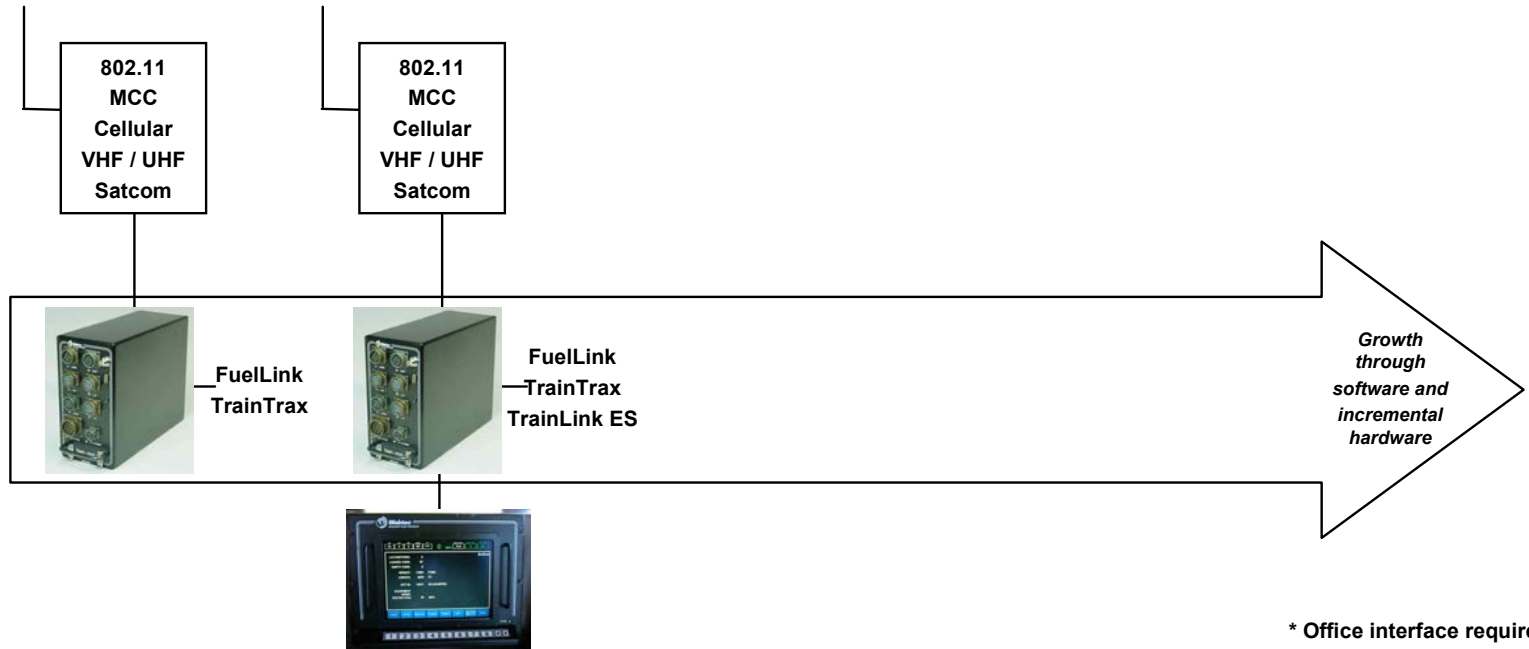*Real-time positioning and offboard reporting*

ETMS 200* –
Adds Human Interface

PLUS:
**Alertness Assurance
Crew Performance
TrainLink ES
Train Pacing
Reactive Enforcement
Digital Display of Authority
Work Zone Protection**

ETMS 300* –
Adds Database

PLUS:
**Train Management
Wayside Interface
Predictive Enforcement
Moving Map
Horn Activation
Auto. Video Surveillance
Signal Overlay**

Available Features / Benefits:

ENABLES:
**Train Location
Fuel Monitoring
Event Recording**

Communication Choices:

802.11 MCC Cellular VHF / UHF Satcom	802.11 MCC Cellular VHF / UHF Satcom	802.11 MCC Cellular VHF / UHF Satcom

Database

System / Growth:

FuelLink
TrainTrax

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

Growth through software and incremental hardware

* Office interface required for some features

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The ETMS Migration Path - ETMS 400

Solution:

ETMS 100* –
Real-time positioning and offboard reporting

ETMS 200* –
Adds Human Interface

ETMS 300* –
Adds Database

ETMS 400* –
Adds Safety Critical processing

Available Features / Benefits:

ETMS 100:
ENABLES:
Train Location
Fuel Monitoring
Event Recording

ETMS 200:
PLUS:
Alertness Assurance
Crew Performance
TrainLink ES
Train Pacing
Reactive Enforcement
Digital Display of Authority
Work Zone Protection

ETMS 300:
PLUS:
Train Management
Wayside Interface
Predictive Enforcement
Moving Map
Horn Activation
Auto. Video Surveillance
Signal Overlay

ETMS 400:
PLUS:
Automatic Authority Generation
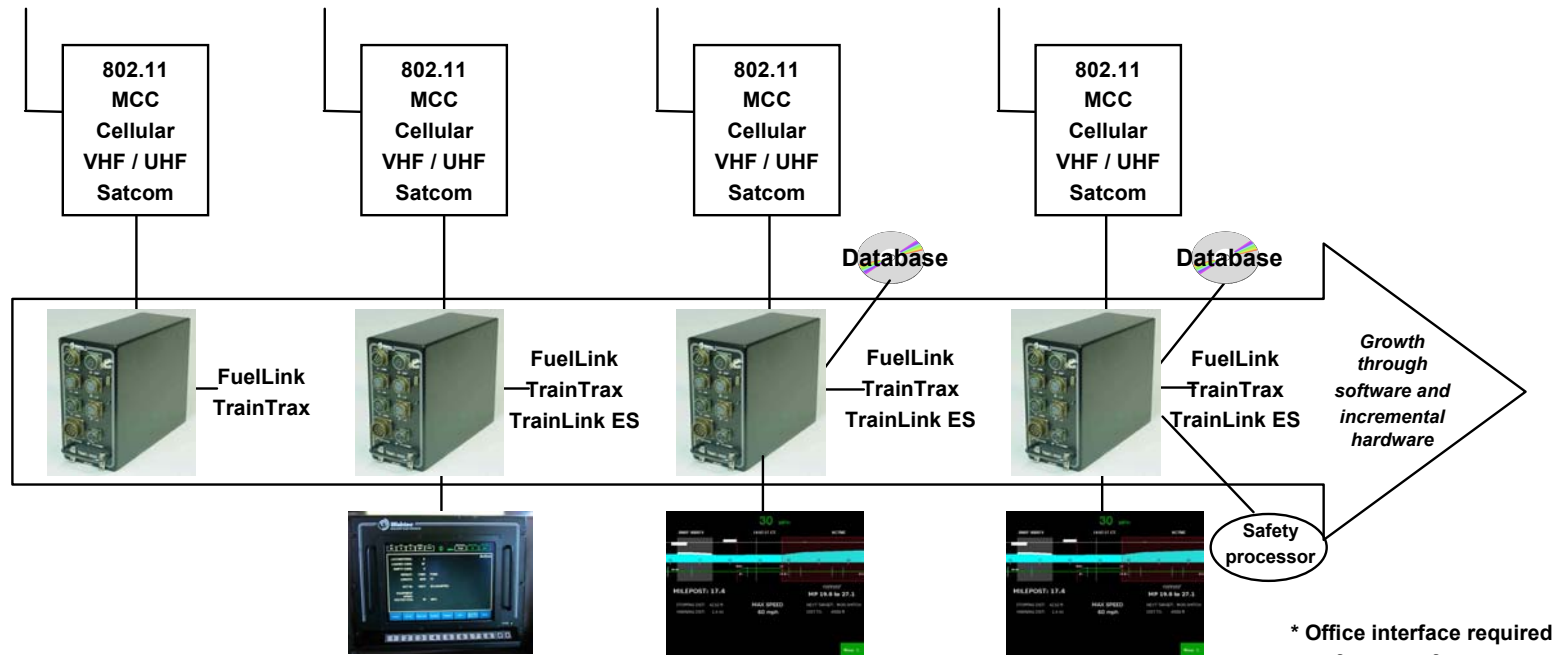Dynamic Moving Block
Crossing Activation

Communication Choices:

(each column):
802.11
MCC
Cellular
VHF / UHF
Satcom

System / Growth:

ETMS 100: FuelLink, TrainTrax

ETMS 200: FuelLink, TrainTrax, TrainLink ES

ETMS 300: FuelLink, TrainTrax, TrainLink ES — Database

ETMS 400: FuelLink, TrainTrax, TrainLink ES — Database — Safety processor

Growth through software and incremental hardware

* Office interface required for some features

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The ETMS Migration Path - CBTM

Solution:

ETMS 100* –
Real-time positioning and offboard reporting

ETMS 200* –
Adds Human Interface

ETMS 300* –
Adds Database

ETMS 400* –
Adds Safety Critical processing

**C
B
T
M**

Available Features / Benefits:

ENABLES:
Train Location
Fuel Monitoring
Event Recording

PLUS:
Alertness Assurance
Crew Performance
TrainLink ES
Train Pacing
Reactive Enforcement
Digital Display of Authority
Work Zone Protection

PLUS:
Train Management
Wayside Interface
Predictive Enforcement
Moving Map
Horn Activation
Auto. Video Surveillance
Signal Overlay

PLUS:
Automatic Authority Generation
Dynamic Moving Block
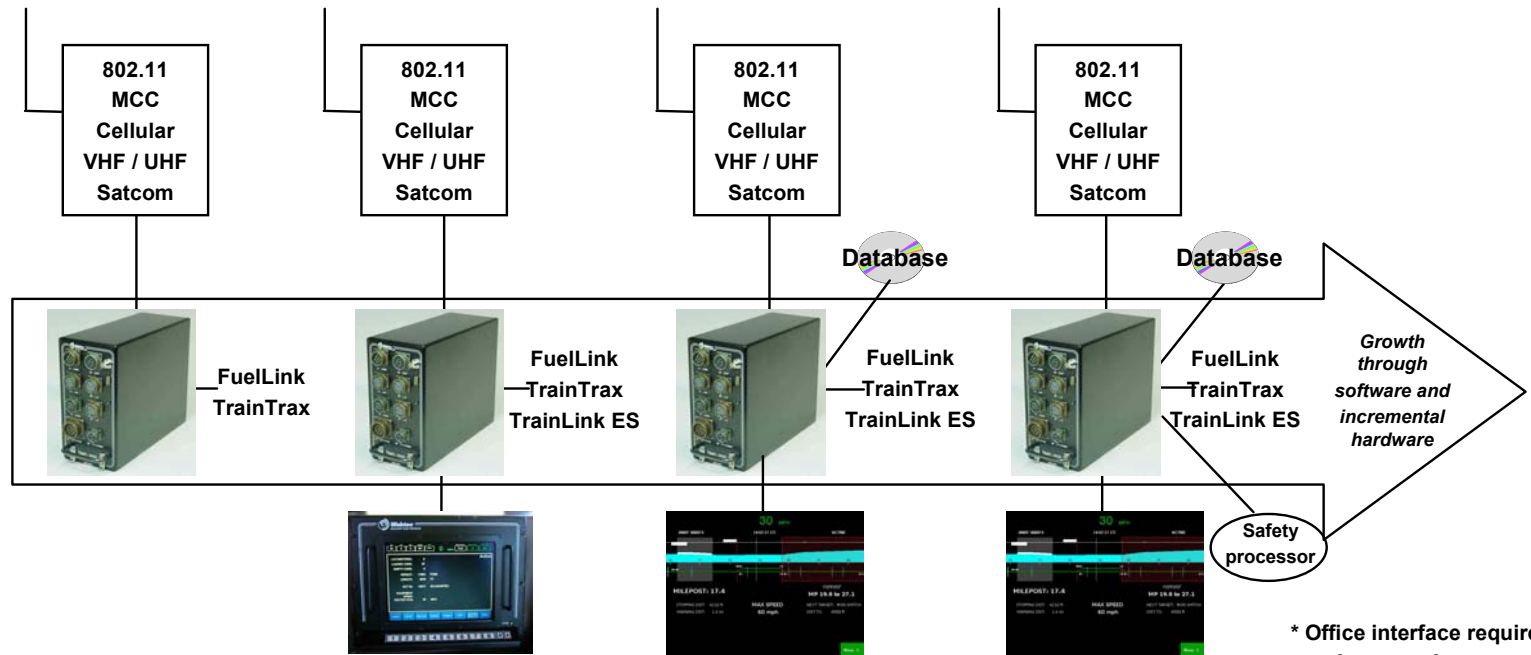Crossing Activation

Communication Choices:

| 802.11 MCC Cellular VHF / UHF Satcom | 802.11 MCC Cellular VHF / UHF Satcom | 802.11 MCC Cellular VHF / UHF Satcom | 802.11 MCC Cellular VHF / UHF Satcom |

Database   Database

System / Growth:

FuelLink
TrainTrax

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

Growth through software and incremental hardware

Safety processor

* Office interface required for some features

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The ETMS Migration Path - BNSF

Solution:	ETMS 100* – *Real-time positioning and offboard reporting*	ETMS 200* – *Adds Human Interface*	ETMS 300* – *Adds Database*	ETMS 400* – *Adds Safety Critical processing*

B N S F

Available Features / Benefits:

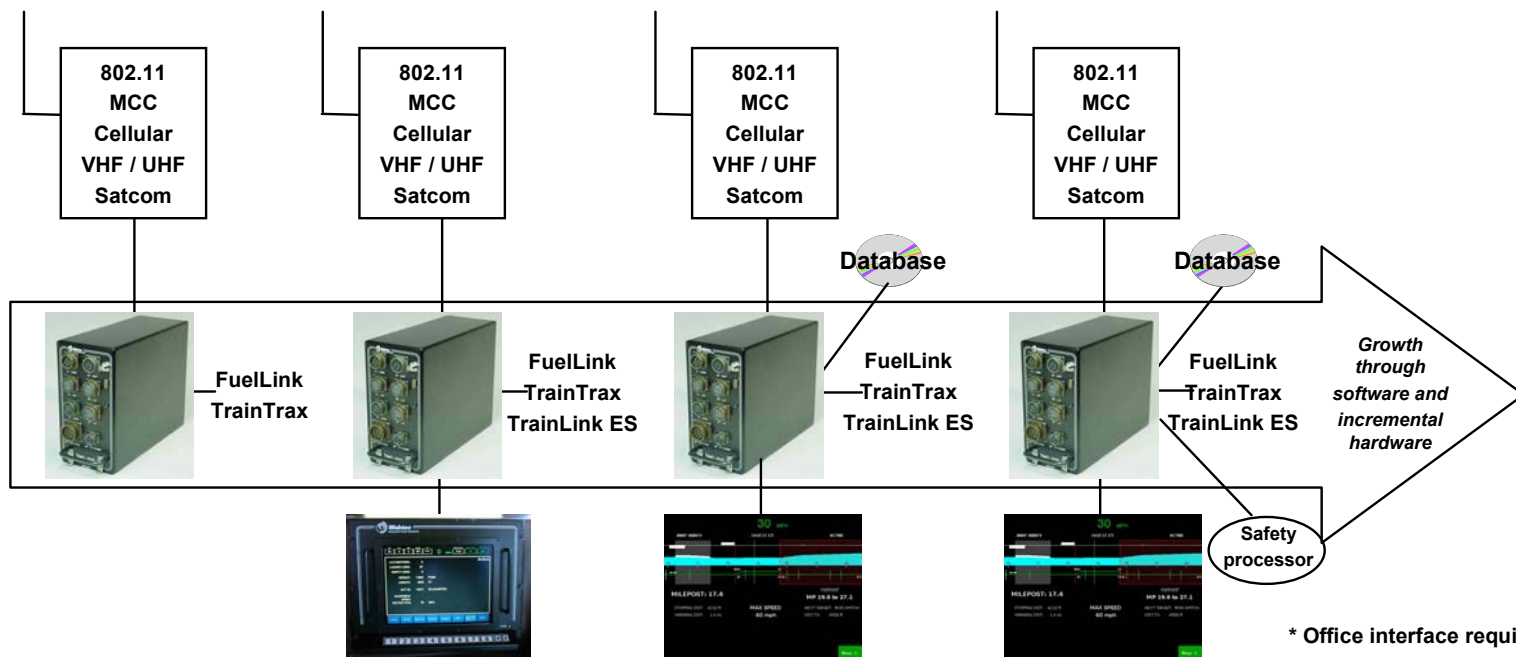|		PLUS:	PLUS:	
	ENABLES:	Alertness Assurance	Train Management	PLUS:
	Train Location	Crew Performance	Wayside Interface	Automatic Authority Generation
	Fuel Monitoring	TrainLink ES	Predictive Enforcement	Dynamic Moving Block
	Event Recording	Train Pacing	Moving Map	Crossing Activation
		Reactive Enforcement	Horn Activation	
		Digital Display of Authority	Auto. Video Surveillance	
		Work Zone Protection	Signal Overlay	

Communication Choices:

802.11 MCC Cellular VHF / UHF Satcom	802.11 MCC Cellular VHF / UHF Satcom	802.11 MCC Cellular VHF / UHF Satcom	802.11 MCC Cellular VHF / UHF Satcom

Database Database

System / Growth:

FuelLink
TrainTrax

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

Growth through software and incremental hardware

Safety processor

* Office interface required for some features

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The ETMS Migration Path - IDOT

Solution:

ETMS 100* –
Real-time positioning and offboard reporting

ETMS 200* –
Adds Human Interface

ETMS 300* –
Adds Database

ETMS 400* –
Adds Safety Critical processing

Available Features / Benefits:

ENABLES:
Train Location
Fuel Monitoring
Event Recording

PLUS:
Alertness Assurance
Crew Performance
TrainLink ES
Train Pacing
Reactive Enforcement
Digital Display of Authority
Work Zone Protection

PLUS:
Train Management
Wayside Interface
Predictive Enforcement
Moving Map
Horn Activation
Auto. Video Surveillance
Signal Overlay

I D O T

PLUS:
Automatic Authority Generation
Dynamic Moving Block
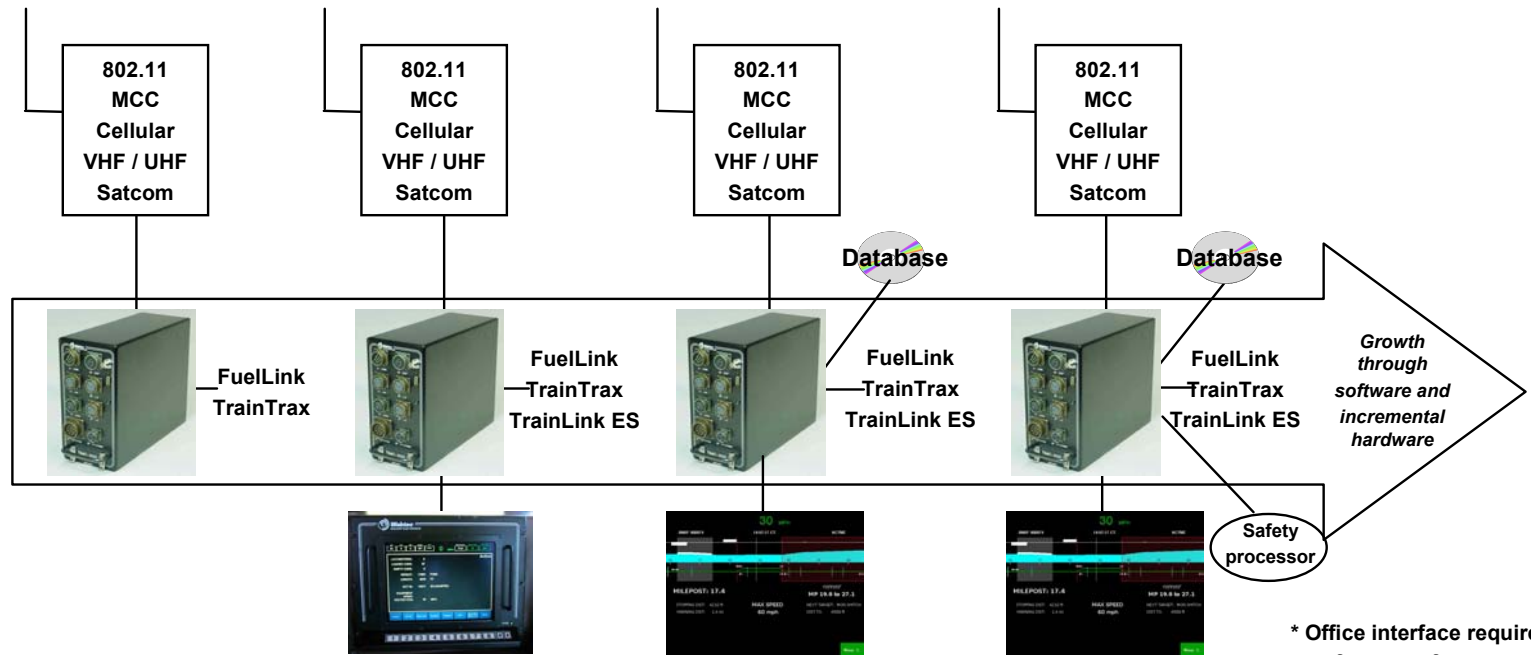**Crossing Activation**

Communication Choices:

802.11
MCC
Cellular
VHF / UHF
Satcom

802.11
MCC
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VHF / UHF
Satcom

802.11
MCC
Cellular
VHF / UHF
Satcom

802.11
MCC
Cellular
VHF / UHF
Satcom

Database

Database

System / Growth:

FuelLink
TrainTrax

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

FuelLink
TrainTrax
TrainLink ES

Growth through software and incremental hardware

Safety processor

* Office interface required for some features

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ETMS™ Interoperability

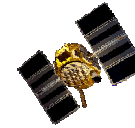**Railroad A**   *Automatically…*   **Railroad B**

Communications Path:

Change to new communications path

Operating Practice:

Switch Operating Mode

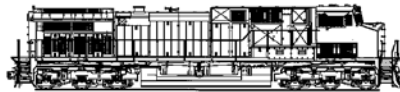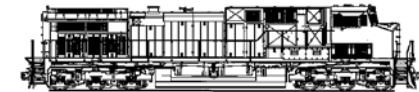*Database:*

Database A   *Access* new database   Database B

…Same Locomotive…

Onboard Package:

Same Onboard Package

…via industry standards

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Conclusion

- Current Systems Tailored to Railroad Requirements

- Wabtec Systems Upgradeable to New Requirements
  - Preserves Investments

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